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G08G

(54) Vehicle anti-collision system

(57) A vehicle anti-collision system in which each vehicle is provided with a combined transmitter/receiver module 13 at the rear which automatically transmits an infra-red beam (for example) when the vehicle brakes are actuated, so that a signal may be transmitted to a following vehicle with a similar device. A similar module 12 at the front receives corresponding signals from leading vehicles and transmits warning signals to them. In the latter case the range of the signal may be increased with increase of vehicle speed so as to provide suitably early warning of vehicle proximity.

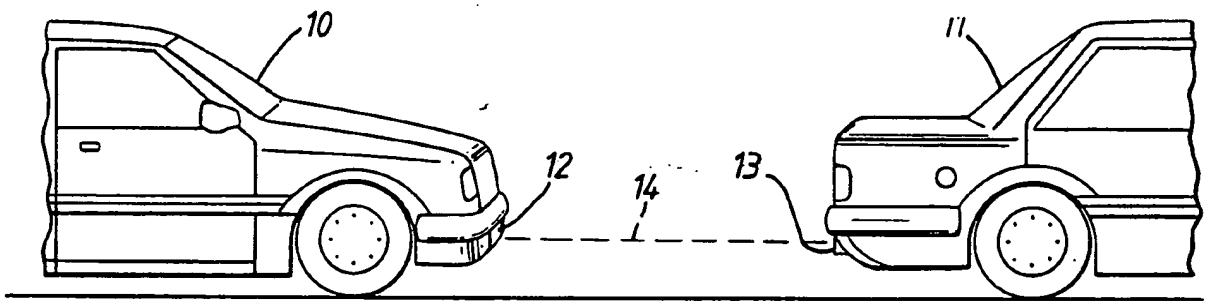

FIG. 1.

GB 2 204 435 A

The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

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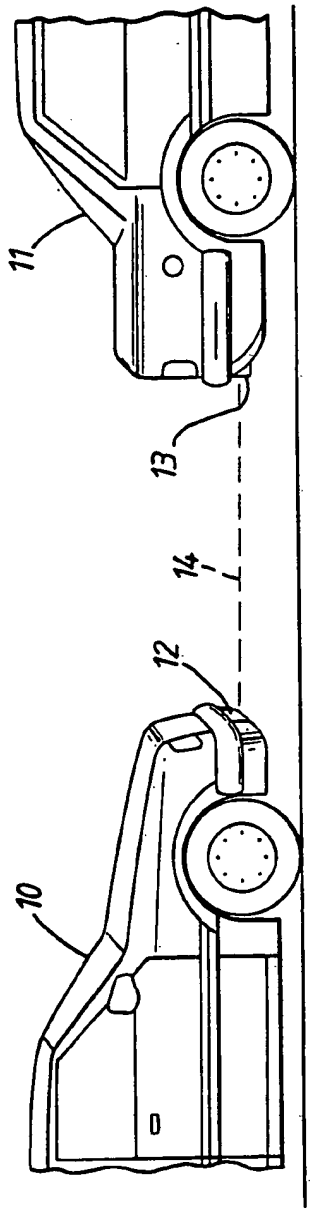

FIG. 1.

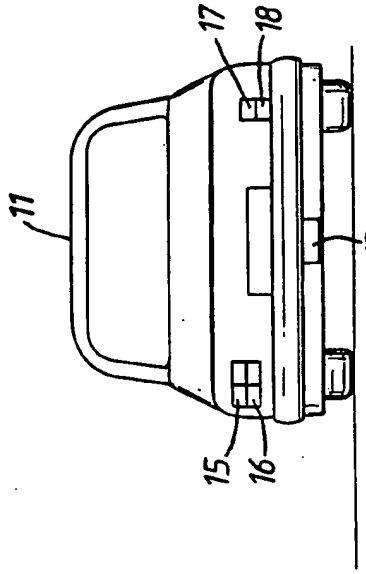

FIG. 2b.

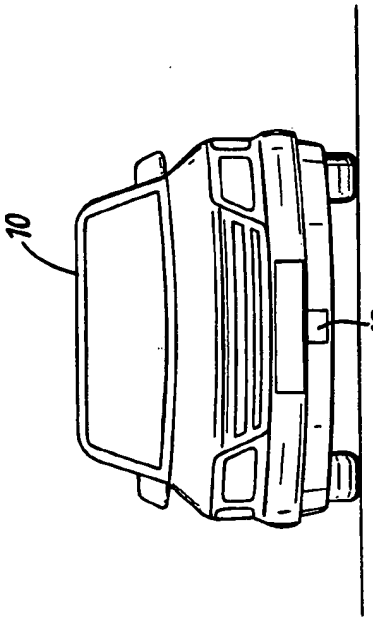

FIG. 2a.

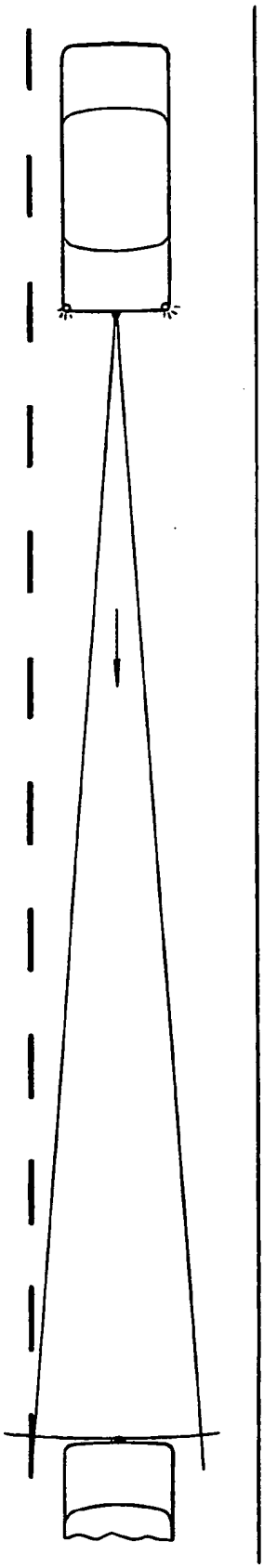

FIG. 3a.

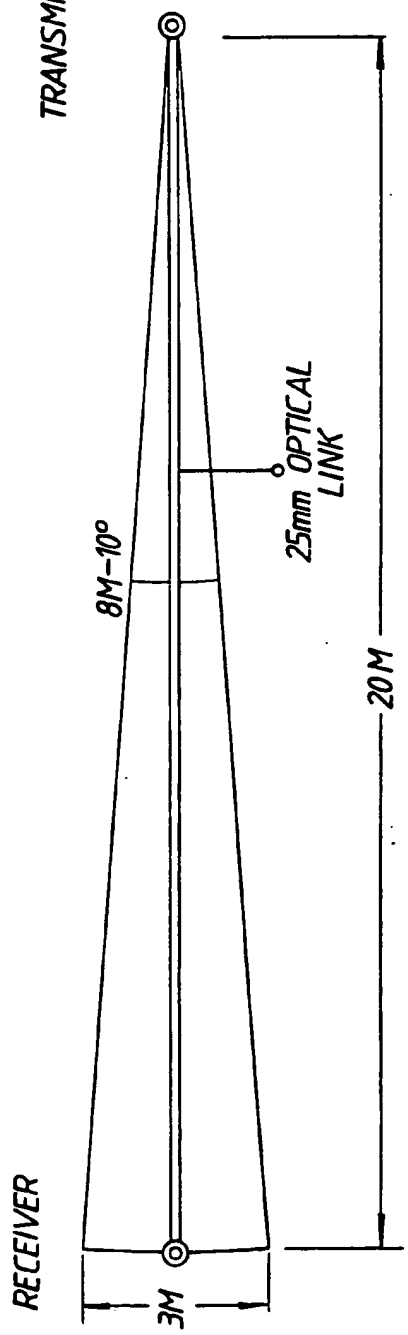

FIG. 3b.

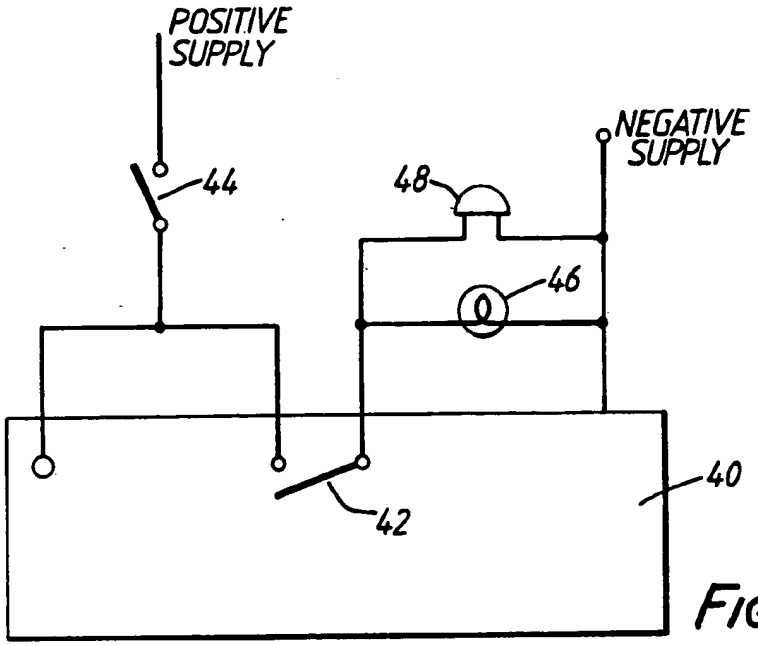
POSITIVE SUPPLY
NEGATIVE SUPPLY
44
48
46
40
42

FIG. 4b.

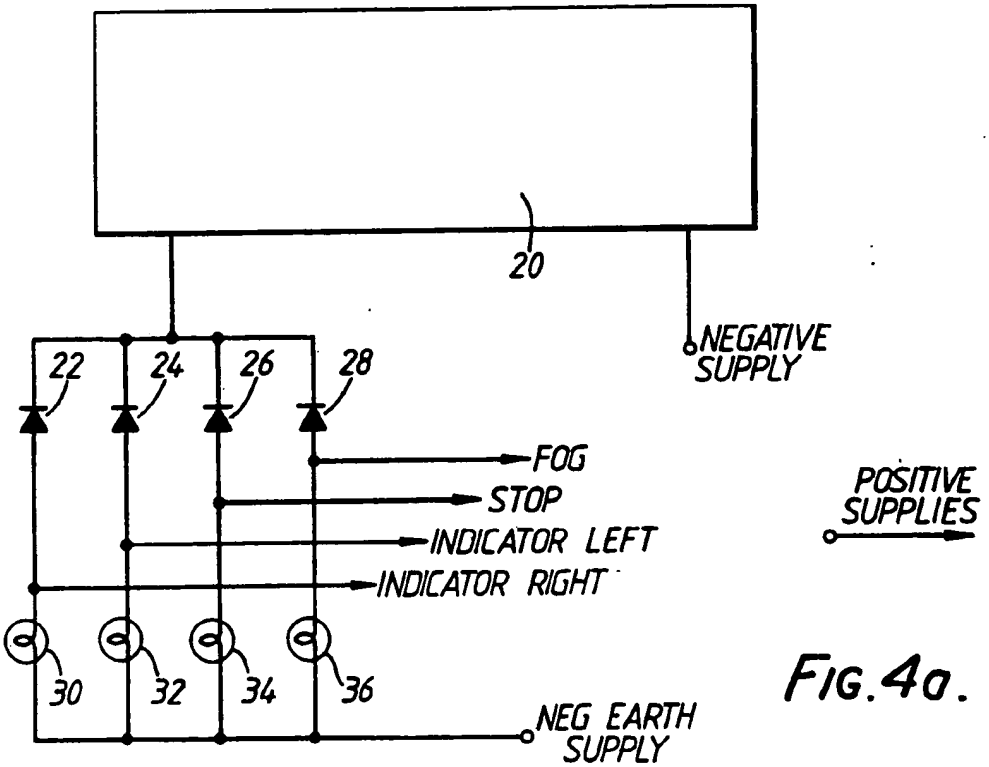
20
NEGATIVE SUPPLY
22
24
26
28
FOG
STOP
INDICATOR LEFT
INDICATOR RIGHT
POSITIVE SUPPLIES
30
32
34
36
NEG EARTH SUPPLY

FIG. 4a.

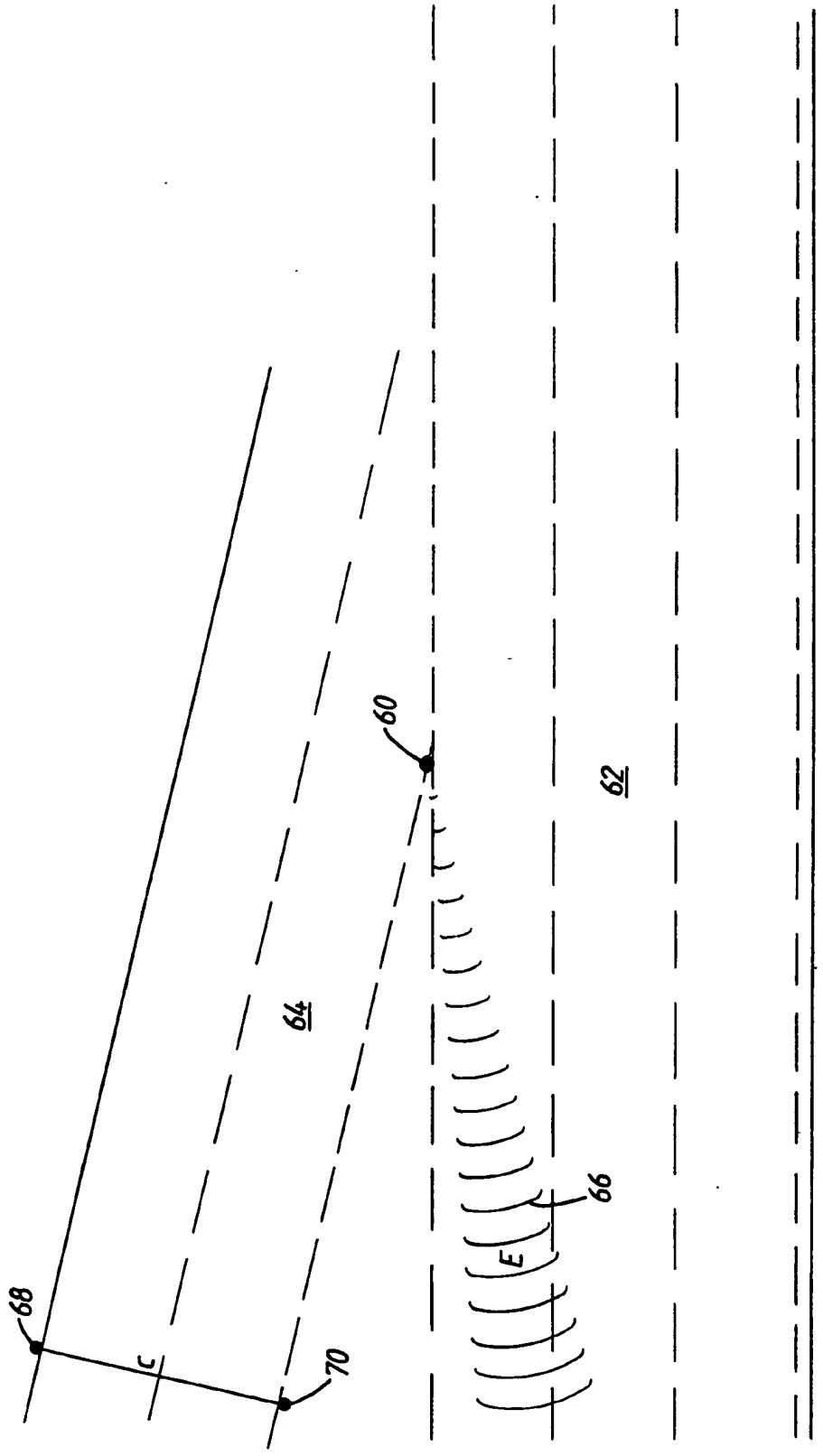

FIG. 5.

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"Vehicle Anti-Collision System"

This invention relates to an anti-collision signalling system for vehicles. Conventional warning systems in vehicles usually rely heavily on the driver's concentration, particularly when driving behind another vehicle when the driver must pay attention to the switching on of brake lights or indicator flashers, for example.

Consequently the present invention seeks to provide a system in which an additional alerting signal can be provided within the driver's own vehicle, so as to effectively relay warnings from other vehicles.

Accordingly, one aspect of the present invention provides a warning system for alerting the drivers of vehicles to the proximity of other vehicles, the system including a transmitter adapted to operate in conjunction with at least one of the pre-existing visual or audio warning devices of the vehicle, so as to broadcast a distinctive signal to other vehicles; and a receiver which is adapted to detect the broadcast signal from a transmitter of another vehicle, and to relay a corresponding alerting signal to the driver.

In a preferred arrangement, the transmitter is adapted for connection to the fog lights, stop lights, and/or indicators or hazard warning lights of a vehicle, so as to automatically broadcast a signal when any of these is actuated. Additionally or alternatively, it may be connected to the headlamp flashing device, so that actuation of the headlamps by the driver causes an additional broadcast signal to be transmitted to receivers on other vehicles.

In addition the signal may be varied in accordance with the speed of the broadcasting vehicle. For example, the effective range of the signal may be increased as the speed increases so as to provide earlier warnings to other

vehicles.

According to a further feature of the invention, the transmitter may be provided with a "parking" or manual control setting, in which it is adapted to automatically transmit an intermittent broadcast signal, for example when the vehicle is parked in a dangerous location or when the driver wishes to broadcast a warning signal for some other reason.

The receiver may be adapted to be disconnected when the vehicle is stationary, for example by means of a switch which responds to the accelerator pedal or hand brake position.

Similarly, intermittently operating transmitters may be mounted at the position of stationary hazards such as level crossing gates, road works, sharp bends or road intersections. In the latter case, the transmitter may be arranged to be triggered to broadcast a signal when a vehicle approaches the hazard or intersection, so as to warn other vehicles. Such an arrangement is particularly useful on motorway slip roads.

When hazard transmitters are arranged at fixed locations in this way, they may be arranged to broadcast characteristic signals which may be interpreted by the receiver in the vehicle so as to display appropriate alerting signals on the vehicle dashboard such as "Fog". "Accident", "Slow", "Road Works", "Diversion" and the like. Preferably, the broadcast signal is in the form of an infra-red beam, so as to be easily distinguishable from ambient radiations such as daylight or vehicle headlamps. In one preferred embodiment of the invention a transmitter and a receiver are incorporated in a single module. This arrangement enables a vehicle to be equipped with such modules both at the front and rear, so that warning signals may be emitted towards another vehicle in front (having a module mounted at its rear end) and/or to another vehicle

behind (having a module mounted at its front end).

As an alternative to an infra-red transmission, any other suitable signal carrier may be used which has adequate transmission characteristics and which is sufficiently distinguishable from any radiation produced incidentally in the environment.

Some embodiments of the invention will now be described by way of example, with reference to the accompanying drawings in which:

Figure 1 is a generally schematic side elevation showing a pair of vehicles having signalling devices according to the invention;

Figures 2a and 2b are front and rear views, respectively, of the vehicles of Figure 1;

Figure 3a is a diagrammatic plan view showing the propagation of the transmitter beam;

Figure 3b is a diagrammatic view of the beam showing its spread over a typical transmission distance;

Figure 4a is a connection diagram of the transmitter side of the device according to the invention; and

Figure 4b is a connection diagram of a preferred form of receiver device according to the invention.

Figure 5 is a diagrammatic plan view of a motorway slip-road warning system utilising the invention.

Referring to the drawings, as shown in Figure 1 the device of the invention preferably comprises a pair of transmitter/receiver modules, utilising infra-red transmitter and receiver elements, which is commercially available as (for example) Radio Spares RS331-613. One such device (12) is mounted beneath the front bumper of a vehicle, whilst another (13) is mounted beneath the rear bumper. A beam (14) can then be transmitted from a leading vehicle (11), for example when the brake lights are applied, so as to be received by the following vehicle (10) to

operate an audible or visual warning device inside the vehicle. Additionally or alternatively, the transmitter 13 may be connected to a fog light (17) so that a constant signal will also be sent as long as the fog lamp is switched on.

Similarly, it can be connected to the indicator/hazard warning light system (15) so as to send an intermittent signal whilst the indicator lights are flashed, and/or to the reversing lights (18) so as to send a constant signal to warn the following vehicle that the leading vehicle is in reverse gear.

Similarly the receiver (12) part of the system may be so connected to the ignition system that it is live whenever the ignition is switched on, and is arranged to actuate an audible/visible warning device on the dashboard of the vehicle whenever it receives a signal from the transmitter (13) of another vehicle. In this way the driver's attention is drawn to the manoeuvrings of the transmitting vehicle.

As shown in Figure 3, the transmitted beam is arranged to be relatively narrow, and in a typical application in which an infra-red transmitter and receiver are used, the beam will be transmitted through a lens having an aperture of 25mm, and will display a spread to a width of approximately 3m over a transmission distance of 20m.

If a combined transmitter/receiver unit is mounted on each of the front and rear of the vehicle, the transmitter at the front of the vehicle can also be used in conjunction with the headlamp flashing circuit of the transmitting vehicle, so that a warning signal could be transmitted from the front of the vehicle, to the rear receiver of a vehicle in front, or to the front receiver of a vehicle coming in the opposite direction. In this way, the driver can send a deliberate signal to other vehicles, in conjunction with his flashing of the headlamps.

Suitable connection arrangements of the preferred transmitter/receiver module are shown in Figures 4a and 4b. Although these are illustrated separately, it will be appreciated that a transmitter and receiver such as the RS331-613 may be incorporated in the same module, and in this case a typical installation as described above will include both of the interconnection schemes of Figures 4a and 4b.

Referring first to Figure 4a, the positive supply terminal of the transmitter module 20 is connected to a network of diodes (22, 24, 26, and 28), each of which is in turn connected in parallel with the fog, stop, and left and right indicator lamps (30-36) of the vehicle, and thus the transmitter only receives a positive supply when one of these lamps is activated.

As shown in Figure 4b, the receiver side 40 of the module incorporates a "relay" circuit 42, which is connected to the positive side of the vehicles electrical supply via a suitable terminal of the ignition switch 44. Visual and audible warning devices 46 and 48 are accordingly actuated, whenever the "relay" circuit 42 is closed. In this way, the reception of a signal from the transmitter 20 causes the receiver 40 to actuate the warning devices in the receiving vehicle.

In the example of the system described above, infra-red signals are used, and the RS331-613 module described incorporates a lens for focussing the transmitted beam, and also a heating element for the lens so as to ensure that condensation does not form on it, since this would reduce the transmission range. It will, however, be appreciated that any other form of suitable signal beam could be used, provided the propagation characteristics were correct, and provided that the system was reasonably interference free. For example, a low energy microwave transmission could also be used.

It is also envisaged that additional signal modulating circuitry could be incorporated, so as to give different types of signal patterns, depending upon whether the original transmission was triggered by a brake light, an indicator, or a fog lamp. For example, a suitable modulating circuit could be connected in the "fog lamp" part of the circuit of Figure 4a, so as to cause a suitable signal to be transmitted from the transmitter module 20, which would in turn cause a rising and fall tone to be generated at the audible warning device (48), by the receiver module (40) of a receiving vehicle. Alternatively or additionally the range of the transmitter could be varied in accordance with the vehicle speed, utilising a signal from the speedometer (for example) to adjust the output power setting.

A further example of the general application of the invention is illustrated in Figure 5. A stationary transmitter "beacon" 60 is placed at the junction of the main carriageway 62 with a slip road 64 and arranged to broadcast a warning signal 66, to vehicles approaching the junction on the main carriageway, when a vehicle is approaching on the slip road. The approaching vehicle may be detected by a receiver circuit in the beacon picking up a signal transmitted from the approaching vehicle, for which purpose the beacon would be equipped with a combined receiver/transmitter module as described above, and arranged to act in a "relay" mode. Alternatively a motion detection device of a known type can be used for detection, such as a beam transmitter/receiver 68 arranged on one side of the slip road to produce a beam which is normally reflected by a facing reflector 70 on the other side, so that interruption of the beam indicates the passage of a vehicle. Again, the device 68 could obviously be constituted by a modified form of the above described transmitter/receiver module.

CLAIMS

1. A warning system for alerting the drivers of vehicles to the proximity of other vehicles, the system including a transmitter adapted to operate in conjunction with at least one of the pre-existing visual or audio warning devices of the vehicle, so as to broadcast a distinctive signal to other vehicles; and a receiver which is adapted to detect the broadcast signal from a transmitter of another vehicle, and to relay a corresponding alerting signal to the driver.

2. A system according to claim 1 in which the said warning device comprises one or more of the stop light, fog light, direction indicator, hazard warning light, horn or headlamp flashing circuits of the vehicle.

3. A system according to any preceding claim in which the transmitter further includes a manual control for operation at the discretion of the driver.

4. A system according to any preceding claim in which the receiver is adapted to be disabled automatically when the vehicle is stationary.

5. A system according to claim 4 in which the receiver is connected to a disabling switch which responds to the accelerator pedal or hand-brake position.

6. A system according to any preceding claim in which the broadcast signal is automatically varied in accordance with the speed of the vehicle.

7. A system according to claim 6 in which the effective range of the signal is increased in accordance

with th speed of the vehicle.

8. A vehicle warning system according to any preceding claim further comprising a stationary device including means for detecting the approach of a vehicle and a transmitter adapted to broadcast a corresponding warning signal for other vehicles.

9. A vehicle warning system according to claim 8 in which the means for detecting the approach of a vehicle comprises a motion detection device arranged to monitor the approach path.

10. A vehicle warning system according to claim 8 in which the means for detecting the approach of a vehicle comprises a receiver which is adapted to respond automatically to the broadcast signal from the transmitter of the approaching vehicle to activate its own transmitter to broadcast a warning signal to other receivers.

11. A vehicle warning system according to any preceding claim in which the broadcast signal is an infra-red signal.

12. A vehicle warning system subtantially as herein described with reference to the accompanying drawings.

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